WHAT IS CLAIMED IS:

1. A method for automatically controlling a production process for the series production of order-specific products,
   - the production process including a first and a second subprocess;
   - a sequence of orders existing in electronic form being generated for products that are manufactured in the production process;
   - a sequence of production objects being manufactured in the first subprocess in accordance with the order sequence;
   - a selection process being carried out, in which a production object of the production-object sequence and an order of the order sequence, which match one another, are selected;
   - from the selected production object in the second subprocess, a product being manufactured in accordance with the selected order;
   - and the selection process and the product manufacturing being repeated until a product is manufactured for each order of the order sequence;

   wherein
   - the production process includes a sorting buffer for production objects which has a fixed maximum number of available spaces for production objects;
   - and, when the first order of the order sequence neither matches a production object in the sorting buffer nor the first production object of the production-object sequence;
     - it is checked whether free spaces are available in the sorting buffer for all production objects residing in the production-object sequence upstream of a production object that matches the first order;
     - and, when a sufficient number of free spaces is available, the first order and the matching production object of the production-object sequence are selected, and all production objects of the production-object sequence are placed upstream of the selected production object in the sorting buffer.

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   - the production process including a first and a second subprocess;
   - a sequence of orders existing in electronic form being generated for products that are manufactured in the production process;
   - a sequence of production objects being manufactured in the first subprocess in accordance with the order sequence;
   - a selection process being carried out, in which a production object of the production-object sequence and an order of the order sequence, which match one another, are selected;
   - from the selected production object in the second subprocess, a product being manufactured in accordance with the selected order;
   - and the selection process and the product manufacturing being repeated until a product is manufactured for each order of the order sequence;

   wherein
   - the production process includes a sorting buffer for production objects which has a fixed maximum number of available spaces for production objects;
   - and, when the first order of the order sequence neither matches a production object in the sorting buffer nor the first production object of the production-object sequence;
     - it is checked whether free spaces are available in the sorting buffer for all production objects residing in the production-object sequence upstream of a production object that matches the first order;
     - and, when a sufficient number of free spaces is available, the first order and the matching production object of the production-object sequence are selected, and all production objects of the production-object sequence are placed upstream of the selected production object in the sorting buffer.

2. The method as recited in claim 1,
wherein
- each order includes features of the product to be manufactured in accordance with order-specific instructions;
- each production object includes features which are manufactured in the first subprocess;
- and, in the test for determining whether a production object and an order match one another, the production-object features are compared to a subset of the product features.

3. The method as recited in claim 2,
wherein
a production object and an order are assessed as matching one another when every product feature of the order belonging to the subset is consistent with all of the features of the production object.

4. The method as recited in claim 2 or 3,
wherein
one feature that is drawn on for the comparison is the latest point in time by when the product is to be completed.

5. The method as recited in one of claims 2 through 4,
wherein
- each product feature is provided with a weighting;
- when comparing a production object with an order using these weightings, a degree of correspondence is determined;
- and a production object and an order are then assessed as matching one another when the degree of correspondence reaches or exceeds a predefined bound.

6. The method as recited in one of claims 1 through 5,
wherein,
during a selection process, when the first order of the order sequence matches a production object in the sorting buffer,
the order and the production object are selected, and the production object is removed from the sorting buffer.

7. The method as recited in one of claims 1 through 6,
wherein
- an initially empty electronic buffer memory is created for orders;
- and, when the first order of the order sequence neither matches a production object in the sorting buffer nor the first production object of the production-object sequence, and when there is an insufficient number of free spaces available in the sorting buffer;
- the first order is placed in the buffer memory.

8. The method as recited in claim 7,
wherein,
during a selection process,
- when an order in the buffer memory matches a production object in the sorting buffer, the order and production object are selected, and the order is removed from the buffer memory, and the production object from the sorting buffer;
- and, when every order in the buffer memory neither matches a production object in the sorting buffer nor the first production object of the production-object sequence, and when a sufficient number of free spaces is available in the sorting buffer, an order in the buffer memory and a production object matching the order, of the production-object sequence are selected, all production objects upstream of the selected production object are placed in the sorting buffer, and the order is removed from the buffer memory.

9. The method as recited in claim 8,

wherein,

- when the number of selection processes during which an order remains in the buffer memory reaches or exceeds a predefined maximum number of selection processes,
- this order and a production object matching it are selected from the production-object sequence,
- and the selected production object is moved up to the first position in the production-object sequence.

10. The method as recited in one of claims 1 through 8,

wherein

- an initially empty electronic buffer memory is created for orders;
- when the first order of the order sequence neither matches a production object in the sorting buffer nor the first production object of the production-object sequence,
- the first order is placed in the buffer memory,
- during a selection process, the orders in the buffer memory are first compared to production objects,
- and, when the number of selection processes during which an order remains in the buffer memory reaches or exceeds a predefined maximum number of selection processes,
- this order and a production object matching it in the sorting buffer or from[1] the production-object sequence are selected,
- and the selected production object is moved up to the first position in the production-object sequence.

11. The method as recited in one of claims 1 through 10,

wherein,

[1] Translator's note: "From" is taken from the wording of the German text and should perhaps be omitted in the translation.

- in accordance with the order sequence, a sequence of order-specific subsystems are manufactured and used in the second subprocess for manufacturing the products;
- the production process includes a sorting buffer for subsystems;
- and a subsystem, which was manufactured on the basis of a deferred order, is placed, before being used, in a free space of the subsystem sorting buffer.

12. The method as recited in claim 11,
wherein
the subsystem sorting buffer has a fixed maximum number of available spaces,
the quotient of
- the maximum number of available spaces of the subsystem sorting buffer, and
- the number of order-specific subsystems, which are used in the second subprocess for manufacturing an order-specific product,

is determined,
and, when the number of orders in the buffer memory for production objects reaches or exceeds the quotient,
- this order and a production object matching it are selected from the production-object sequence,
- and the selected production object is moved up to the first position in the production-object sequence.

13. The method as recited in one of claims 1 through 12,
wherein
the sequence of orders in the order sequence prior to the first selection process is compared to the sequence in which the orders are selected,[2]

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[2] Translator's note: This portion of claim 13 is ambiguous in the German text with regard to where "prior to" comes in the phrase. A second version could read, *"prior to the first selection process, the sequence of orders in the order sequence is compared to the sequence in which the orders are selected."* However, the first version above seems more logical and is supported by a relevant passage in the 5th subparagraph of claim 24.

for each order, its relative position in the selection sequence being determined in comparison to the position in the order sequence,
and a positional quality of the production process being computed from the relative positions of all of the orders.

14. The method as recited in claim 13,
wherein,
when calculating the positional quality,
- the greatest value of all relative positions;
- the smallest value of all relative positions;
- and/or the average value of all relative positions
are determined.

15. The method as recited in one of claims 1 through 14,
wherein
- the sorting buffer includes a plurality of sorting sub-buffers for production objects;
- before a production object is placed in the sorting buffer, a sorting sub-buffer is automatically selected, and the production object is placed in the same.

16. The method as recited in claim 15,
wherein
- a current valuation **[an updated assessment]** is generated for each sorting sub-buffer with respect to a production object to be placed and is used for selecting the sorting sub-buffer;
- and the valuation is generated by computing one of the following individual valuations or by combining a plurality of the following individual valuations:
  - the current total number of production objects in the sorting sub-buffer;
  - the current number of those production objects in the sorting sub-buffer that were selected in a previous selection process, but were not yet removed from the sorting sub-buffer;

- the current total number of those production objects in the sorting sub-buffer, which differ in each case by at least one feature from the production object to be placed;
- the expenditure of time required to place the production object to be placed, into the sorting sub-buffer.

17. The method as recited in one of claims 1 through 15,
wherein
- a reference sequence of reference orders existing in electronic form is generated for reference products that are manufactured in the production process;
- a sequence of reference production objects is manufactured in the first subprocess in accordance with the reference order sequence;
- an electronic copy of the reference production-object sequence and an electronically available model of the sorting buffer are generated;
- various possible values are predefined for the maximum number of available spaces of the sorting buffer for production objects;
- for each one of the predefined possible values;
  - the maximum number of available spaces of the sorting buffer model is set to the value;
  - a simulation is performed for all selection processes using the reference order sequence, the copy, the sorting buffer model and the buffer memory;
    a reference production-object copy being able to be placed in the model when the model still has a free space;
- one of the possible values is selected as a function of the results of the simulations;
- and a sorting buffer having the selected value as a maximum number of available spaces is used for the selection processes of the order sequence.

18. The method as recited in claim 17,
wherein
for each one of the predefined possible values for the maximum number

- the sequence of orders in the reference order sequence prior to the first selection process is compared to the sequence in which the reference orders are selected in the simulation for this value;[3]

  for each reference order, its relative position in the reference selection sequence being determined in comparison to the position in the order sequence;
- and, from the relative positions of all of the reference orders, a positional quality for this value being computed;

and the value being selected as a function of the ascertained positional qualities.

19. The method as recited in claim 17 or 18,

wherein

- an initially empty electronic buffer memory is created for reference orders;
- in a simulation, when the first reference order of the reference sequence does not match any reference production-object copy in the sorting buffer model, and when the model has an insufficient number of free spaces, the first reference order is placed in the buffer memory;
- for each of the predefined possible values, it is determined how many reference orders of the reference-order sequence were placed in the buffer memory over the course of the simulation for this value;
- a value is selected, which leads in the simulation to a proportion of placed reference orders that is smaller than or equal to a predefined bound on the proportion;
- and a sorting buffer having the selected value as a maximum number of available spaces is used for the selection processes of the order sequence.

20. The method as recited in one of claims 17 through 19,

wherein

- various possible, automatically evaluable procedures are specified for testing whether a production object and an order match one another or not; and

[3] Translator's note: See Footnote 7.

- for each of the predefined possible values and for each possible test procedure, the simulation of all selection processes is undertaken, in the simulation, the test procedure being used for comparing reference orders to reference production-object copies.

21. The method as recited in claim 20,
wherein
- various possible subsets of product features are predefined;
- and, for each possible subset, the test procedure is generated and used as a possible test procedure,
- which assesses a production object and an order as precisely matching one another when each product feature of the order which belongs to the possible subset is consistent with all of the features of the production object.

22. The method as recited in claim 17,
wherein
- the sorting buffer includes a plurality of sorting sub-buffers for production objects; and the sorting buffer model includes a plurality of sorting sub-buffer models;
- before a production object is placed in the sorting buffer, a sorting sub-buffer is automatically selected, and the production object is placed in the same,
a valuation function being used to generate a current valuation **[an updated assessment]** of each sorting sub-buffer;
- various possible valuation functions being predefined;
- a simulation of all selection processes including the selection of sorting sub-buffer models being performed for each possible valuation function using this valuation function; and
- one of the possible valuation functions being selected as a function of the simulation results.

23. The method as recited in claim 22,

wherein,

for each possible valuation function, a plurality of simulations is performed, over whose course at least one sorting sub-buffer model is deactivated at least temporarily.

24. The method as recited in claim 12,

wherein

- various possible values are predefined for the maximum number of available spaces of the sorting buffer for subsystems;
- a reference sequence is generated of reference orders existing in electronic form, for reference products that are manufactured in the production process;
- a sequence of reference production objects is manufactured in the first subprocess in accordance with the reference order sequence;
- selection processes for reference orders and reference production objects are carried out as often as needed, until every reference order of the sequence has been selected;
- the maximum number of relative positions by which a reference order in the sequence, in which the reference orders are selected, lies behind the position of the reference order in the reference order sequence prior to the first selection process, is determined;
- the product of this maximum relative position and the number of order-specific subsystems which are used for manufacturing an order-specific product, is calculated;
- and, as a sub-system sorting buffer, a sorting buffer is used, whose number of available spaces for subsystems is greater than or equal to the product.

25. A device for automatically controlling a production process for the series production of order-specific products,

- the production process including a first and a second subprocess;
- a sequence being provided of orders existing in electronic form, for products that are manufactured in the production process;

- a sequence of production objects being manufactured in the first subprocess in accordance with the order sequence;
- the device including means for implementing a selection process for selecting a production object of the production-object sequence and an order of the order sequence which match one another; and
- from the selected production object in the second subprocess, a product being manufactured in accordance with the selected order;

wherein

the device

- includes a sorting buffer for production objects which has a fixed maximum number of available spaces for production objects;
- means for checking whether a production object of the production-object sequence and an order of the order sequence match one another;
- means for checking whether a production object in the sorting buffer and an order of the order sequence match one another;
- means for checking whether free spaces are available in the sorting buffer for all production objects residing in the production-object sequence upstream of a production object that matches the first order;
- means for placing a production object of the production-object sequence in the sorting buffer.

26. The device as recited in claim 25,

wherein

the device includes

- an electronic buffer memory for orders;
- means for placing an order in the buffer memory;
- means for checking whether a production object of the production-object sequence and an order in the buffer memory match one another;
- and means for removing an order from the buffer memory.

27. The device as recited in claim 25 or claim 26,

wherein

the device includes

- a sorting buffer for subsystems which are manufactured in accordance with the order sequence and are used in the second subprocess for manufacturing the products;
- and means for placing such a subsystem in the subsystem sorting buffer.

28. The device as recited in one of claims 25 through 27,

wherein

- the sorting buffer includes a plurality of sorting sub-buffers for production objects;
- and the device includes
  - means for automatically selecting a sorting sub-buffer;
  - and means for placing a production object into a selected sorting sub-buffer.

29. The device as recited in claim 28,

wherein

the means for automatically selecting a sorting sub-buffer include

- means for generating a current valuation **[an updated assessment]** of each sorting sub-buffer with respect to a production object to be placed;
- and means for using the valuations for selecting a sorting sub-buffer.